MISSISSIPPI STATE UNIVERSITY

INVITATION FOR BIDS
OFFICE OF PROCUREMENT & CONTRACTS

1. INSTRUCTIONS FOR BIDDERS

a. Sealed bids will be received in the Office of Procurement & Contracts, Mississippi State University, for the purchase of the items listed herein.

b. All bids must be received in the Office of Procurement & Contracts on or before the bid opening time and date listed herein. Delivery of bids must be during normal working hours, 8:00 a.m. to 5:00 p.m. CST, except on weekends and holidays when no delivery is possible.

c. Bidders shall submit their bids either electronically or in a sealed envelope.
   i. Sealed bids should include the bid number on the face of the envelope as well as the bidders' name and address. Bids should be mailed to: 245 Barr Avenue, 610 McArthur Hall, Mississippi State, MS 39762.
   ii. At this time we only accept non-ITS bids electronically. For electronic submission of bids, go to: https://www.portal.magic.ms.gov and use the RFX number on the next page as your reference number.

d. All questions regarding this bid should be directed to the Office of Procurement & Contracts at 662-325-2550.

2. TERMS AND CONDITIONS

a. All bids should be bid "FOB Destination"

b. Bidders must comply with all rules, regulations, and statutes relating to purchasing in the State of Mississippi, in addition to the requirements on this form. General Bid Terms and Conditions can be found here: https://www.procurement.msstate.edu/procurement/bids/Bid_General_Terms_May_2019_V2.pdf

c. Any contract resulting from this Invitation for Bid shall be in substantial compliance with Mississippi State University's Standard Contract Addendum: https://www.procurement.msstate.edu/contracts/standardaddendum.pdf

Bid Number/RFX Number: 22-43/RFX#3160004911
Opening Date: March 16, 2022 @2:00 p.m.
Description: Pad Mounted Switchgear & Transformers (Material Only)

Vendor Name: _____

Vendor Address: _____

Telephone Number: _____

Days the Offer is Firm: _____

Authorized Signature: _____

Name: _____

Title: _____

See following pages for specifications and bid pricing form.

Specifications & Materialman's Proposal
For
Pad-Mounted Switchgear & Transformer
(Material Only)

February 9, 2022

Prepared for:

Mississippi State University
610 McArthur Hall
Mississippi State, Mississippi 39762

Prepared by:

Atwell & Gent, P.A.
309 University Drive
Starkville, Mississippi 39759

JEFFREY ATWELL
REGISTERED PROFESSIONAL
ENGINEER
14774
STATE OF MISSISSIPPI

02/09/2022

Job No.: 601E3077

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INSTRUCTION TO BIDDERS

15 KV PAD-MOUNTED SWITCHGEAR & PAD-MOUNTED TRANSFORMER (MATERIAL ONLY)
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

Bids that are sent by mail shall be clearly marked "Bid Enclosed" or "Bid Envelope Enclosed" as appropriate. The sealed envelope containing the bid shall have the following information shown on the envelope:

BID ENCLOSED
ITEM: 15 KV PAD-MOUNTED SWITCHGEAR & PAD-MOUNTED TRANSFORMER (MATERIAL ONLY)
OWNER: MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI
BIDDER: BIDDER'S ADDRESS
BID DUE: REFER TO ADVERTISEMENT FOR BIDS

Bids that are sent by parcel delivery service or hand-delivered should be addressed to:

Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
Barr Avenue, 610 McArthur Hall
Mississippi State, Mississippi 39762

Bids that are sent by mail should be addressed to:

Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
P.O. Box 5307
Mississippi State, Mississippi 39762

The Engineer for this project is:

Atwell & Gent, P.A.
P.O. Box 2558
Starkville, Mississippi 39760-2558
Telephone (662) 324-5658

The Engineer will represent the Owner in all matters pertaining to this project, including but not limited to, answering technical questions of prospective bidders and recommendations of lowest and best bid, acceptance of shop drawings and similar documents, and approval of invoices prior to payment by the Owner.

Submit all questions about the specifications to the Engineer, in writing. Replies will be issued to all prospective Bidders of Record. Neither the Engineer nor the Owner will be responsible for oral clarifications.

Pad-mounted switchgear and pad-mounted transformer unit prices shall be FIRM for delivery to the Owner as specified herein or firm with commodity price modifiers. Bidder shall indicate whether the pad-mounted switchgear price and/or pad-mounted transformer unit price is firm or a firm price with commodity modifiers. If Bidder submits a bid with commodity modifiers, a complete description of the method of calculating the final price of the transformer shall accompany the bid.

Bidders shall complete all blank spaces on the Materialman's Proposal Form for each item of equipment being bid in accordance with these specifications and terms and conditions. Bidder should insert the unit price in the blank under the Unit Price heading and multiply this unit price by the number shown in the Number Required heading and enter the product of this multiplication in the blank under the heading Total Price for each bid item on the Materialman's Proposal Form. The bidder shall sum the Total Bid Price for each Bid Item and enter this sum in the Total Bid Price.

Bidder shall insert the delivery time in weeks after receipt of an order for each item of equipment bid in the blank provided on the Materialman's Proposal Form. Bidder shall also indicate equipment being bid by the manufacturer's name and catalog number in the blanks provided on the Proposal Form. Bidder shall indicate warranty term to be provided in the blanks on the Proposal Form.

Bidder shall complete the Materialman's Proposal Form bound in these Specifications and shall submit two copies to the OWNER at the time that the bids are due. Bidders taking exceptions to any part of the specifications, conditions, or payment terms specified herein shall show such exception on the Materialman's Proposal Form in the space provided. If exceptions are not shown on the Proposal Form, Bidder must supply equipment specified herein under the terms and conditions specified herein. Proposal forms shall remain bound in the Specifications. Proposals that are modified, excepted, or in any way changed from the proposal that the OWNER is requesting in this request for proposals may be rejected by the OWNER.

It is intent of the OWNER to award the bid for these 15 KV PAD-MOUNTED SWITCHGEAR & TRANSFORMERS (MATERIAL ONLY) on an individual low basis to the bidder with lowest and best responsive bid for Bid Item #1 and #2 respectively. It is not necessary to bid both bid items. Unusually long lead times may be cause for rejection of bid by OWNER.

PROPOSAL FORM

15 KV PAD-MOUNTED SWITCHGEAR & PAD-MOUNTED TRANSFORMER (MATERIAL ONLY)
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

To: Mr. Don Buffum, Director
Office of Procurements & Contracts
Mississippi State University
Barr Avenue, 610 McArthur Hall
Mississippi State, Mississippi 39762

The undersigned (hereinafter called the MATERIALMAN) acknowledges by his signature that he has received and examined the documents entitled "Specifications and Materialman's Proposal for 15 KV PAD-MOUNTED SWITCHGEAR & PAD-MOUNTED TRANSFORMER (MATERIAL ONLY) for Mississippi State University (hereinafter called the OWNER), dated February 9, 2022, and has included the provisions of the Specifications in his Proposal. The MATERIALMAN further acknowledges that he has received the following addenda:

Addendum No. _____ Dated _____

The Materialman hereby proposes to sell and deliver to OWNER, upon the terms and conditions herein stated, the equipment specified in the attached specification for the following sums:

Bid Item	Description	Unit Price	No. Req'd	Unit	Total Price
1	Pad-Mounted Switchgear	_____	1	EA	_____
2	1500 kVA Pad-Mounted Transformer	_____	1	EA	_____

The above unit price for Bid Item #1 pad-mounted switchgear is (mark appropriate box):

☐ Firm for delivery as specified herein.

☐ Firm with commodity price modifiers.

The above unit price for Bid Item #2 pad-mounted transformer is (mark appropriate box):

☐ Firm for delivery as specified herein.

☐ Firm with commodity price modifiers.

NOTE: If price has commodity price modifiers, Bidder shall submit with his bid a complete description of the method that will be utilized to calculate the final price.

A. The total prices set forth above shall be firm if accepted by the OWNER within forty-five (45) days and shall include delivery to OWNER, ready for OWNER's use.

B. The prices set forth herein do not include any sums which are or which may be payable by the MATERIALMAN on account of taxes imposed by any taxing authority upon the sale, purchase, or use of the equipment. If any such tax is applicable to the sale, purchase, or use of the equipment, the amount thereof shall be added to the purchase price and paid by the OWNER.

C. The items included in each of the above bid prices are as follows:

BID ITEM NO. 1

MANUFACTURER: _____

CATALOG NO.: _____

BID ITEM NO. 2

MANUFACTURER: _____

CATALOG NO.: _____

D. The warranty (in years) for each of the above bid items shall be as follows:

BID ITEM NO. 1: _____

BID ITEM NO. 2: _____

E. The times of delivery shall be as follows:

BID ITEM NO. 1: _____

BID ITEM NO. 2: _____

F. Title of the equipment shall pass to the Owner upon:

1. Delivery to location specified.
2. Satisfactory inspection for in-transit damage.
3. Acceptance by the Owner.

G. The MATERIALMAN shall include engineering data with his proposal as specified and as required to evaluate bid.

H. Bidder hereby certifies that he is:

( ) Manufacturer

( ) Manufacturer's Authorized Mississippi Representative

I. Exceptions: _____

_____

_____

_____

_____

_____

_____

J. It is understood by the undersigned that the OWNER retains the privilege of accepting or rejecting all or any part of this proposal and to waive any informalities or technicalities therein. Counter-proposals or qualified bids shall be subject to rejection at the discretion of the OWNER.

It is also understood by the undersigned that the OWNER reserves the right to conduct investigations to evaluate the proposals received and to award the bid for this equipment to the lowest Bidder, who in the OWNER's evaluation will provide the equipment which will be in the best interest of the OWNER.

MATERIALMAN:

BY: _____

TITLE: _____

COMPANY: _____

ADDRESS: _____

_____

TELEPHONE NO.: _____

EMAIL: _____

DATE SIGNED: _____

SPECIFICATION FOR 15 KV PAD-MOUNTED SWITCHGEAR UNIT

1.1 SCOPE

A. Section Includes:

1. Bid Items
2. References.
3. Submittals.
4. Quality Assurance.
5. Critical Requirements.
6. Construction.

1.2 BID ITEMS

A. Bid Item #1: S&C Electric Vista "321" Pad Mounted Switchgear Unit with S&C Vista 15 kV 6-Way Enclosure.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C37.72 - Manually Operated, Dead Front Padmounted Switchgear with Load Interrupting Switches and Separable Connectors for Alternating Current Systems.
2. ANSI C37.112 -IEEE Standard Inverse-Time Characteristic Equations for Overcurrent Relays.
3. ANSI C57.12.28 - Pad-Mounted Equipment - Enclosure Integrity.

B. Institute of Electrical and Electronics Engineers:

1. IEEE 386 - Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600 V.

C. National Electrical Manufacturers Association:

1. NEMA 260 - Safety Labels for Pad Mounted Switchgear and Transformers Sited in Public Areas.

1.4 SUBMITTALS

A. Submit catalog data on all equipment items specified in this section to be utilized on this Project.

B. Sufficient information, clearly presented shall be included to determine compliance with Drawings and Specifications.

C. The specific item proposed and its area of application shall be marked on the catalog cuts.

D. Shop Drawings: Indicate electrical characteristics and connection requirements, outline dimensions, connection and support points, weight, specified ratings and materials.

E. Product Data: Submit electrical characteristics and connection requirements, standard model design tests, and options.

F. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.5 QUALITY ASSURANCE

A. Furnish manufacturer's standard one-year warranty on pad mounted switchgear.

B. Switchgear shall be manufactured within the United States of America.

1.6 CRITICAL REQUIREMENTS

A. Product Description:

1. Bid Item #1: ANSI C37.72 pad mounted switchgear, 15 kV, 600 ampere, SF6 insulated, deadfront construction, with two switched ways and one fault interrupter way, with oversized 15 kV 6-Way switchgear cabinet, suitable for installation where accessible by general public.

B. Ratings:

1. System Voltage: 13.2 kV nominal, three phase, 60 Hz.
2. Maximum Design Voltage: 15.5 kV.
3. Insulation Type and Level: SF6 insulated, 95 kV BIL.
4. Main Bus and Switch Ampacity: 600 amperes, continuous.
5. Short Circuit Rating: 12,500 rms symmetrical amperes at rated nominal voltage.

C. Construction:

1. Single-sided Construction. All cable terminations shall be located on one side of the switchgear unit.
2. Cable Grounding: All ways, both load interrupter switch and fault interrupter, shall be three-position type (closed- open- ground).
3. Cabinet Dimensions: Cabinet shall be approximately 61" x 102" so that its fits on an existing concrete pad foundation and accommodates existing conduit stub-ups.
4. Cabinet Height: Switchgear cabinet shall be low profile and in no case shall its overall height exceed 54".
5. Base Spacer: Cabinet shall be furnished with 12" base spacer.

D. Controls: Provide microprocessor-based overcurrent control for switchgear unit. Control shall incorporate ANSI C37.112 relay curves. Switchgear shall be capable of being programmed

using a laptop computer. The control shall at a minimum feature the following time-current characteristic (TCC) curves:

1. Standard "E" speed curves.
2. Standard "K" speed curves.
3. IEEE C37.112-1996 "U" relay curves. Time dial settings shall be available in 0.1 increments from 0.0 to 10.0.

Controls provided shall be manufacturer's most advanced model available.

E. Potential Indication with Test Feature: Provide LCD display to indicate presence of voltage on each phase, and solar panel to supply power for testing of complete voltage-indication circuit and phasing circuit. One potential indicator shall be provided for each bus-terminal, load interrupter switch, and fault-interrupter way.

1.7 CONSTRUCTION

A. Switching:

1. Bid Item #1: Two (2) three-pole load interrupter switches and one (1) three-pole fault interrupter switch.

B. Switchgear Tank: Welded stainless steel.

C. Pad Mount Enclosure: Steel, conforming to requirements of ANSI C37.72 and C57.12.28.

D. Finish Color: The exterior of the unit shall be painted Carboline F235 Dark Bronze (or as accepted).

E. Load Interrupter Switches:

1. Three-position (closed-open-ground) type. The load interrupter switches shall provide three-pole live switching of 600-ampere three phase circuits.
2. Load interrupter switches shall provide a visible gap when open.
3. Operating shafts shall be pad lockable in any position. The operating shaft shall be capable of being locked to prevent operation to the ground position.
4. The load interrupter switches shall be furnished with a manual handle to charge the switch operating mechanism or to actuate the operating mechanism. Operating mechanism shall be capable of providing quick-make, quick break operation in either switching direction. The operating mechanism shall be designed to prevent inadvertent operation from the closed position directly to the ground position and vice versa.
5. Load interrupter switch terminals shall be equipped with three single pole 600-ampere bushings designed to ANSI/IEEE 386 Standards to accept all standard 600-ampere insulated deadbreak elbows.

F. Fault Interrupter Switches:

1. Three-phase resettable fault interrupters shall be provided in the switchgear for live switching of tap circuits and for fault interruption of tap circuits. Fault interrupters shall be vacuum or arc spinning contact type.

2. The fault interrupters shall be operated by a spring operating mechanism that is recharged with a manually operated handle. The operating mechanism shall operate independently of the speed of the manual handle. Trip indicators shall be provided on the fault interrupters that indicate the contact position is open. This indicator shall be fully visible through viewing windows in the switchgear tank.

3. Fault interrupters shall provide three-pole fault interruption and three-pole load switching.

4. The fault interrupters shall be non-reclosing, manual reset devices. An electronic assembly shall sense load and fault current on each phase of the load tap circuits. The electronic control shall be powered from current transformers mounted inside of the SF6 insulated switchgear tank. No external power source shall be required for overcurrent protection.

5. Fault interrupter switch terminals shall be equipped with three single pole 200-ampere bushings designed to ANSI/IEEE 386 Standards to accept all standard 200-ampere insulated loadbreak elbows.

G. Grounding Lugs: Furnished with one ground pad installed on switchgear unit and one ground pad installed on pad mount enclosure. Ground pads shall be NEMA two-hole type.

H. Labeling: Furnish safety labels in accordance with NEMA 260.

I. Accessories:

1. Mounting Provisions for Fault Indicator: Provide mounting provisions for fault indicators installed on each phase of load interrupter switches. Provide viewing windows for fault LED indicating lights for each phase of all load interrupter switches (e.g. three (3) per load interrupter switch).

2. Potential Indication with Test Feature: Provide LCD display to indicate presence of voltage on each phase, and solar panel to supply power for testing of complete voltage-indication circuit and phasing circuit. One potential indicator shall be provided for each bus-terminal, load interrupter switch, and fault-interrupter way.

J. Controls: Provide standard microprocessor-based overcurrent control for switchgear unit. Control shall incorporate ANSI C37.112 relay curves. Switchgear shall be capable of being programmed using a laptop computer. The control shall at a minimum feature the following time-current characteristic (TCC) curves:

1. Standard "E" speed curves.
2. Standard "K" speed curves.
3. IEEE C37.112-1996 "U" relay curves. Time dial settings shall be available in 0.1 increments from 0.0 to 10.0.

Controls provided shall be manufacturer's most advanced model available. Switchgear shall be furnished with all required Windows-compatible software and programming cables, adapters, and all other components required to field program control from standard laptop computer.

K. Demonstration and Field Training: Manufacturer shall include four hours of on-site training by a factory authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain medium-voltage switchgear units and controls.

SPECIFICATION FOR PAD-MOUNTED TRANSFORMER

1.1 SCOPE

A. Section Includes:

1. Bid Items
2. Scope.
3. References.
4. Submittals.
5. Quality Assurance.
6. Pad Mounted Transformers.

1.2 BID ITEMS

A. Bid Item #2: 1500 kVA 13,200-480Y/277 Pad Mounted Transformer.

1.3 SCOPE

A. Section Includes:

1. Liquid Filled Transformers.
2. Service Conditions.
3. Ratings.
4. Transformer Efficiencies and Losses.
5. Accessories.
6. Noise.
7. Factory Finishing.
8. Quality Control.

1.4 REFERENCES

A. American National Standards Institute:

1. ANSI C37.47 - American National Standard Specifications for Distribution Fuse Disconnecting Switches, Fuse Supports, and Current-Limiting Fuses.
2. ANSI C57.12.28 - Pad-Mounted Equipment - Enclosure Integrity.
3. ANSI C57.12.34 - Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers (2500 kVA and Smaller) - High Voltage: 34500GrdY/19920 Volts and Below; Low-Voltage: 480 Volt 2500 kVA and Smaller.
4. ANSI C57.12.90 - Test Code for Liquid-Immersed Distribution, Power and Regulation Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers.

5. ANSI C57.91 - Guide for Loading Mineral Oil Transformers.

B. Department of Energy:

1. 10 CFR Part 431 - Department of Energy - Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule.

C. Factory Mutual Engineering and Research (FM):

1. FM P7825 - Approval Guide.
2. FM 3990 - Approval Standard for Less or Nonflammable Liquid-Insulated Transformers.

D. Institute of Electrical and Electronics Engineers:

1. IEEE 386 - Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600 V.
2. IEEE C57.12.00 - Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
3. IEEE C57.106 - Guide for Acceptance and Maintenance of Insulating Oil in Equipment.

E. National Electrical Manufacturers Association:

1. NEMA TR1 - Transformers, Regulators and Reactors.
2. NEMA 260 - Safety Labels for Pad mounted Switchgear and Transformers Sited in Public Areas.

1.5 SUBMITTALS

A. Submit catalog data on all equipment items specified in this section to be utilized on this Project.

B. Sufficient information, clearly presented shall be included to determine compliance with Drawings and Specifications.

C. The specific item proposed and its area of application shall be marked on the catalog cuts.

D. Shop Drawings: Indicate electrical characteristics and connection requirements, outline dimensions, connection and support points, weight, specified ratings and materials.

E. Product Data: Submit electrical characteristics and connection requirements, standard model design tests, and options.

F. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.6 QUALITY ASSURANCE

A. Furnish manufacturer's standard one-year warranty on pad mounted transformer.

B. Quality Assurance: Pad mounted transformers shall be manufactured within the United States of America.

SECTION 2 PRODUCTS

2.1 PAD MOUNTED TRANSFORMERS

A. Manufacturers: Ermco, Cooper Power Systems, Howard Industries, ABB.

B. Substitutions: None.

C. Product Description: ANSI C57.12.26, three phase, pad mounted, self-cooled, liquid filled transformer unit.

D. Approval Listing: Pad-mount transformers shall be FM Global Listed or U.L. Listed.

E. Cooling and Temperature Rise: IEEE C57.12.00, Class OA, 65 degrees C, self-cooled.

F. Insulating Liquid: Furnish with new lless-flammable transformer liquids conforming to NFPA 70 and FM requirements for less-flammable liquids having a fire point not less than 300 degrees C. The fluid shall be a biodegradable electrical insulating and cooling liquid classified by UL and approved by FM as "less flammable" fluids.

2.2 SERVICE CONDITIONS

A. Meet requirements for usual service conditions described in IEEE C57.12.00.

B. Maximum Ambient Temperature: 104 degrees F.

2.3 RATINGS

A. Bid Item #2:

1. Capacity: 1500 kVA.
2. Primary Voltage: 13.2 kV delta connected.
3. Secondary Voltage: 480/277 volt wye connected.
4. Impedance: ANSI C57.12.00 standard impedance, 5.75 percent maximum.
5. Basic Impulse Level: 95 kV primary, 30 kV secondary.
6. Taps: Standard primary taps, 2 FCAN and 2FCBN. Taps shall be suitable for de-energized operation only.

2.4 TRANSFORMER EFFICIENCIES AND LOSSES

A. Efficiencies and Losses: 10 CFR Part 431. Transformers shall comply with the latest DOE Energy Conservation Standards and Test Procedures, with the allowed tolerances as defined in the DOE Test Procedures.

2.5 ACCESSORIES

A. Furnish IEEE C57.12.00 standard accessories and magnetic liquid level gage. For transformers 1,500 kVA and larger, equip with dial thermometer with maximum oil temperature indicator and pressure vacuum gauge.

B. Tap Changer: Externally-operated type.

C. Primary Terminations: Bushing wells with non-corrosive clamping rings conforming to IEEE 386. Furnish six (6) 200-Ampere, loadbreak, 15 kV class bushing inserts for loop feed operation.

D. Primary Overcurrent Protection: Conforming to ANSI C37.47.

1. Bayonet-type, liquid-immersed, dual sensing expulsion fuses. Manufacturer: Cooper Power Systems.

2. Internally mounted partial range current-limiting fuses, 50 kA interrupting rating. Manufacturer: Cooper Power systems Type ELSP.

3. Fuse sizes shall be indicated by a label or by nameplate on the interior of the low voltage compartment

E. Secondary Terminations: Epoxy low-voltage bushings with spade lugs. Transformers shall be equipped with fully insulated, epoxy low-voltage bushings. Low-voltage terminals shall be tinned copper spade-type with 9/16" holes spaced on 1.75 inch centers. Low-voltage terminals shall be staggered 8" vertically and 6" horizontally to facilitate the installation of bushing type metering current transformers. Units 500 kVA and smaller shall have eight-hole spade type terminals. Units 750 kVA and larger shall have sixteen-hole spade type terminals. Number and arrangement of low-voltage bushings shall be in accordance with ANSI C57.12.34. All spade pads shall be furnished with additional support, as designed by the manufacturer. The supports shall be attached to the pads at the farthest point from the tank wall and attached in a manner so as to not interfere with any of the pad's holes.

F. Grounding Lugs: Furnished with one ground pad installed in the transformer low-voltage compartment and one ground pad installed in the transformer high-voltage compartment. Ground pads shall be NEMA two-hole type.

G. Oil Drain Valve: Transformer shall come equipped with an oil drain valve installed at the bottom edge in the transformer primary compartment, ¾" minimum diameter, gate or ball activated.

H. Pressure Relief: Furnish transformer with pressure relief device in accordance with ANSI C57.12.26.

I. Nameplate: Furnish stainless steel or anodized aluminum instruction nameplate in accordance with ANSI C57.12.00. Nameplate shall indicate transformer ratings, proper connection and fusing information and total gallons of oil. Nameplate shall also indicate that the PCB content of said transformer is less than 1 part per million or at time of manufacture gas chromatograph analysis certified non-detectable PCB.

J. Labeling: Furnish safety labels in accordance with NEMA 260. Rating of transformer in kVA shall be indicated on the front of transformer tank.

2.6 NOISE

A. Transformer sound levels shall not exceed the values specified in the latest revision of NEMA Publication TR-1.

2.7 FABRICATION

A. Mild steel tank and termination cabinet, conforming to requirements of ANSI C57.12.28.

B. The high-voltage and low-voltage compartments, separated by a metal barrier, shall be located side-by-side on one side of the transformer tank. When viewed from the front, the low-voltage compartment shall be on the right. Each compartment shall have a door that is constructed so as to provide access to the high-voltage compartment only after the door to the low-voltage compartment has been opened. There shall be one or more additional fastening devices that must be removed before the high-voltage door can be opened. Where the low-voltage compartment door is of a flat panel design, the compartment door shall have three-point latching with a handle provided for a locking device. Hinge pins and associated barrels shall be constructed of corrosion-resistant material, passivated AISI Type 304 or the equivalent.

C. A recessed, captive, penta-head or hex-head bolt that meets the dimensions per ANSI C57.12.28 shall secure all access doors.

D. The enclosure integrity of the tank and cabinet shall meet the requirements for tamper resistance set forth in ANSI C57.12.28 including but not limited to the pry test, pull test, and wire probe test.

E. The minimum depth of the apparatus compartment shall be 24".

2.8 FACTORY FINISHING

A. Finish: The coating system shall meet or exceed ANSI C57.12.28 coating system requirements for pad -mount equipment, including the following performance tests:

1. Salt spray test per ASTM B117 / D1654.
2. Cross hatch adhesion test ASTM D3359.
3. Humidity test per ASTM D4585 / D3363.
4. Impact test per ASTM D2794 / B1117.
5. Ultraviolet accelerated weathering (QUV) test per ASTM G154 / D523.
6. Abrasion resistance Taber abraser test per ASTM D4060 / B1117.

B. Finish Color: The exterior of the unit shall be painted Carboline F235 Dark Bronze (or as accepted).

2.9 QUALITY CONTROL:

A. All units shall be tested for the following:

1. No-Load (85°C or 20°C) losses at rated current.
2. Total (85°C) losses at rated current.
3. Percent Impedance (85°C) at rated current.
4. Excitation current (100% voltage) test.
5. Winding resistance measurement tests.
6. Ratio tests using all tap settings.
7. Polarity and phase relation tests.
8. Induced potential tests.
9. Full wave and reduced wave impulse test.